



Newsletter

Volume 4, Number 1
January - February 1987

This winter at the Arboretum ...

Take a course, or courses, in our Adult Education Program. There are still openings in some winter semester classes, and in all spring semester classes.

For an exciting educational experience, sign up for an IES ecological excursion!

Join our Sunday Ecology Programs on the first and third Sunday of each month.

See the Winter Calendar on the last page of this Newsletter for information on all our current public programs.

The IES Newsletter is published by the Institute of Ecosystem Studies at the Mary Flagler Cary Arboretum. Located in Millbrook, New York, the Institute is a division of The New York Botanical Garden. All newsletter correspondence should be addressed to the Editor.

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Dr. Likens Receives Award

"In recognition of his worldwide influence in ecology and environmental education", Institute of Ecosystem Studies Director Dr. Gene E. Likens was awarded The New York Academy of Sciences Award for 1986. The presentation was made at the Academy's 169th Annual Meeting and Dinner on December 11th, 1986, held at the Vista International Hotel at New York's World Trade Center.

In announcing this prestigious award, consisting of a certificate of citation and \$5,000, Academy President Dr. William S. Cain continued by reporting that Dr. Likens' research at the Hubbard Brook Ecosystem Study "led to discoveries of major importance including 'acid rain' and (impacts of) forest harvesting". The Hubbard Brook Ecosystem Study is a long-term research program in the White Mountains of New Hampshire that was initiated in 1963 by Dr. Likens in collaboration with Dr. F. Herbert Bormann of Yale University and Dr. Robert S. Pierce of the U.S. Forest Service. To date, this study has resulted in the publication of over 500 scientific



NYAS PHOTO

Dr. Likens, right, accepting award from New York Academy of Sciences President Dr. William Cain.

papers and three books about biogeochemistry and the structure and function of land and water ecosystems.

The New York Academy of Sciences is an international organization with a membership of over 52,000 scientists from the 50 states and 84 foreign countries. The Academy, with a long tradition of education in science, annually sponsors an average of 20 international conferences concerned with active research in a variety of disciplines.

IES and Millbrook Schools Collaborate

This spring, the Institute of Ecosystem Studies will be doing pilot educational programs in two Millbrook schools. In November 1986, IES Head of Education Dr. Alan R. Berkowitz and Program Specialist in Education Kass Hogan received word that a planning grant had been awarded to the Institute by the New York State Council on the Arts (NYSCA). The purpose of NYSCA's environmental education grants is to facilitate a link between schools and community resources, and the IES award will make it possible for Ms. Hogan to work closely with teachers in the Alden Place Elementary School and the Millbrook High School to develop special ecology programs.

One of these programs is Eco-Inquiry, which helps fifth and sixth graders understand scientific concepts through first-hand experience and experimentation. Eco-Inquiry was described in detail in the last issue of the IES Newsletter. Ms. Hogan will work with

Millbrook's elementary school science coordinator and with fifth and sixth grade teachers to develop a new sequential Eco-Inquiry program: fifth grade students at the Alden Place Elementary School will participate this spring, and as sixth graders in fall will be encouraged to extend the scientific concepts and skills learned.

Millbrook High School students will also benefit from the NYSCA grant. Ms. Hogan will be starting "Eco-Issues" for 10th grade students enrolled in Unified Science, a two-year program that combines material from all the scientific disciplines within a social issues framework. During April and May these students will be involved in a study of the impact of acid rain on aquatic ecosystems. Working with the Unified Science teachers, Ms. Hogan will combine in-class sessions with field work at an IES research demonstration project dealing with acid rain.

Director's Award to Millbrook Student

In presenting a special award to Erik K. McCarron on December 19th, 1986, Dr. Gene E. Likens read the following citation:

Erik McCarron came to work for Dr. Stuart Findlay over a year ago. A student at Millbrook High School, Erik has demonstrated initiative, responsibility, and a real commitment to getting the job done. He has assisted in both field work and a variety of laboratory assignments related to studies of the East Branch of

Wappinger Creek and a marsh on the Hudson River.

Erik has the distinction of being the youngest member of the scientific support staff. His contributions to research demonstrate maturity beyond his years and auger well for his future education and career. I am very pleased to recognize Erik McCarron's commitment and performance at the Institute of Ecosystem Studies with this Director's Award.

Elusive Bobcat Tagged

Over the past twelve years there have been approximately four bobcat sightings on the Arboretum. On October 31st, 1986, however, IES wildlife ecologists had the rare opportunity to get to know one of these elusive predators more closely.

As part of the wildlife research program, traps are set on the Arboretum so that mammal populations may be studied. Animals caught in the traps are taken to the lab, weighed, measured, examined and tagged, and then released back at the site of their capture. (In addition to the rare bobcats, large predators at the Arboretum are red fox, of which seven were tagged during 1986, and coyotes, which are proving to be even more elusive to IES ecologists than the bobcat!) Research assistants Rob Hossler and Mike Fargione were routinely checking their traps last Halloween morning when the ball of fur that from a distance looked like a raccoon turned out to be *Lynx rufus* ... a bobcat.

One of the scientists used a noose attached to a pole to keep the animal's head turned while the second injected an immobilization drug. Minutes later they were able to carry it to the Wildlife Laboratory where a thorough physical examination was performed. The bobcat



LISA H. BANDAZIAN

was a juvenile (approximately one year of age) male weighing 7.7 kilograms (17 lbs) and in excellent health. As part of the Lyme Disease research being done by IES Wildlife Ecologist Jay McAninch, the animal was checked for ticks (none was found) and blood samples were taken to be tested for antibodies to the Lyme Disease bacterium. Finally, a

permanent ear tag was attached, with an identification number. The immobilization drug wore off quickly, and within a few hours the bobcat had recovered. He was released at the site of capture, the oldfield brushy habitat in the northern part of the Arboretum, that afternoon.

These feline predators are known in Dutchess County, especially in areas of lower human population density. As is the case with all wild felines, bobcats are solitary by nature and have home ranges of approximately 5.2 square kilometers (2 square miles). Each cat "maintains" its claim on a home range by leaving scent marks around the perimeter. Communication among cats, both resident and transient, is largely accomplished by this scent marking system. The young bobcat handled by the IES ecologists was likely a transient individual that will be settling into an area within the next year. Hopefully his appearance is an indication that this beautiful animal will become a more common sight at the Arboretum.

Jungleburgers

How often do people stop to consider the implications to an ecosystem when they sit down for a meal?

Forest Ecologist Dr. Geoffrey G. Parker, an IES postdoctoral associate, and Professor Christopher Uhl at Pennsylvania State University are two who did just that. Their calculations showed that a 125 gram hamburger (approximately four ounces) was produced on 6.25 meters of land which formerly had been rain forest.

Drs. Parker and Uhl are actively involved in research in Central and South American rain forests and are concerned that over the past 25 years large tracks of jungle have been converted to cattle pastures. United States corporations import much Central American beef because it is lean and less expensive than that produced here in the States, and they use it for hamburger, luncheon meat, baby food and pet food.

So, how did Parker and Uhl go about their calculations? A hectare -- about 2.5 acres -- of healthy rain forest has about 800,000 kilograms (close to 1.8 million pounds!) of plants and animals. When this plot is deforested and the pasture established, weight gain by the beef cattle is about 50 kilograms per hectare per year, or 400 kilograms (882 lbs.) over the average eight-year lifetime of such pasture land. About half of each animal is non-food material such as skin and bone, leaving 200 kg of beef to produce 1,600 typical hamburger patties.

To determine how much life in the rain forest is equivalent to one hamburger "grown" where that forest once stood, the scientists divided the original weight of 800,000 by those 1,600 hamburgers produced over the lifetime of a one hectare pasture, and came up with the figure of 500 kg -- roughly half a ton of plants and animals. One hectare is equivalent to 10,000 square meters, so the actual area represented by this jungleburger is 10,000 divided by 1,600: 6.25 square meters, or 67.28 square feet ... the size of a small kitchen!

In editorials that appeared recently in the scientific journals *BioScience* and *Interciencia* (a South American publication), Drs. Parker and Uhl described the 500 kilograms of plant and animal life that might be found in that 6.25 square meter area of jungle:

One vigorous tree, 18.3 m (60 feet) tall 450 kilograms

50 seedlings and young trees, representing 20 or 30 different species, several of which might be extremely rare... 47 kg

In the vegetation, thousands of insects of more than 100 species 1 kg (There is good reason to suspect that several of those insect species would not yet be known to science.)

Dozens of birds, reptiles and mammals would pass through and use this forest patch. 1 kg

A tremendous number of mosses, fungi and micro-organisms associated with

surfaces, bark, roots and soil would make up the final..... 1 kg

In addition to providing homes for millions of individuals and thousands of species of plants and animals, rain forests are breeding areas for thousands of migratory birds. They provide habitat for medicinal and nutritive plant species of proven value to humans ... and for untold others known at present only to local Indian tribes (see note at the end). Rain forest products such as spices, nuts, rubber and valuable timber are commonplace. Finally, these areas play a significant role in stabilizing global climate.

Cattle pastures on former jungle land are not productive for long. Once the delicate rain forest ecosystem is disturbed or destroyed the soil quickly loses its ability to sustain growth, especially growth of grasses alone. Even after they are abandoned as pastures, these areas return to forest slowly and may never again contain their original forest species. The short-term financial gain that results from deforestation comes at a high price in natural resources. The *Interciencia* editorial (Sept. - Oct. 1986, p. 213) concludes:

We must acknowledge that consuming rain forest beef is tantamount to consuming rain forest. Might rain forests be more valuable in their natural state -- as sources of timber, raw materials and new food and drug plants -- than they are when converted into ephemeral hamburgers?

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New Staff

STEWARD T.A. PICKETT, plant ecologist. Dr. Pickett was introduced to IES Newsletter readers a year ago, while he was spending a sabbatical at the Institute. He was invited to accept a permanent position as an IES associate scientist, and started work at the beginning of January.



Dr. Pickett's major research interest is the nature and causes of vegetation dynamics. While at Rutgers he did a permanent plot study in the Hutcheson Memorial Forest, where there is the longest continuous record of oldfield succession -- the process by which open fields return to forest -- in the United States. He will continue and expand his experiments there on resource levels (nutrients, water and light) in plant succession, and will begin new work on herbivory and succession. Herbivores, or plant eating animals, appear to have a more important role in succession than was previously believed. By building cages around plants to exclude mammals ranging from mice to deer (burrowing mammals, such as moles, will be excluded by sheet metal sunk into the ground!), this role can be scientifically measured. Similar studies can be done at IES, and the results compared.

He is also taking advantage of a unique natural situation, which he has dubbed the "Mount St. Helens of the East", that occurred in Pennsylvania in May, 1985. In an old growth forest -- an area that had never been cut, with trees as old or older than this nation -- a cluster of tornadoes blew down 364 hectares (900 acres) of trees. Dr. Pickett and a graduate student are studying the nature of the damage and will observe and record the natural regeneration processes occurring over the years.

Dr. Pickett will set up long-term research plots at the Arboretum as well, but is taking his time in deciding exactly how to proceed. Over the next few months he will be discussing potential studies with other IES ecologists, tapping into their expertise and investigating possibilities of joint projects dealing with resources, abandonment histories and disturbance in local oldfields.

The Institute makes postdoctoral appointments to enable outstanding young ecologists to contribute to the Institute's program and to establish themselves in the scientific community:

GEORGE B. McMANUS, aquatic microbiologist, became an IES postdoctoral associate on November 3rd, 1986, immediately after receiving his



Ph.D. in coastal oceanography from the State University of New York at Stony Brook.

The research leading to his thesis dealt with the feeding by protozoa on bacteria, and with the population dynamics of those predators and prey. He worked not only in Long Island Sound but also in Chesapeake Bay and in the coastal upwelling region off Chile, in South America. His major

emphasis was developing field methods to measure bacterial growth and protozoan feeding.

At IES Dr. McManus will be continuing that work. He wants to return to Chile where the coastal upwelling results in distinct bursts of protozoa, phytoplankton and bacteria over short periods of time. He hopes to go to Antarctica as well, where the very cold water temperatures put bacteria at a disadvantage, to learn about adaptations made by the protozoa that rely on bacteria for food. He also plans to expand the scope of his studies to include freshwater environments, and will work with IES assistant scientists Stuart Findlay and Michael Pace comparing population dynamics of protozoa and bacteria in three lakes in the Northeast.

Promotion

CLIVE G. JONES has been promoted to associate scientist, effective January 1st, 1987. A chemical ecologist on the Arboretum staff since 1980, Dr. Jones was appointed assistant scientist at IES in June 1984. His research on the interactions between plants, insects and micro-organisms has gained wide recognition, and includes studies such as the prediction of gypsy moth outbreaks and the effects of ozone stress on cottonwood trees.



Each year The New York Botanical Garden honors staff members at an Award and Recognition Ceremony. At the December 18th, 1986 ceremony, six from the Institute of Ecosystem Studies received the Certificate of Achievement. Above, left to right: Bonnie Fiero, Senior Gardener; Barbara McPeck, Receptionist/Typist; Roger Powell, Assistant Maintainer; Dr. James M. Hester, President, NYBG; Wayne Cahilly, Research Assistant; Robert Hossler, Research Assistant; Ralph Elliott, Maintainer.

In addition, the following employees received recognition for their years of service: 10 to 14 years: Stephen Bialousz, James Boice, David Bulkeley, Janice Claiborne, Bonnie Fiero, Allan Kling, William Newkirk, John Olson, Roger Powell, Bradley Roeller, Owen Vose, Raymond Winchcombe 15 to 19 years: Ralph Elliott 31 to 34 years: Richard Livellara.

March 6th: Dr. Thomas Eisner

On Friday evening, March 6th, Dr. Thomas Eisner will give a special public lecture at the Institute of Ecosystem Studies. This presentation, "Better Living Through Chemistry -- Insect Style", will be an informal slide-illustrated discussion of some of Dr. Eisner's more interesting findings in the course of his fascinating research on insects' uses of chemistry in their struggles to survive.

Dr. Eisner, who is particularly interested in the bombardier beetle (he calls this amazing creature the Annie Oakley of insects because of its ability to shoot pulses of boiling liquid at its enemies), is the world's leading authority on insect defense and communication. He is the Jacob Gould Schurman Professor of Biology at Cornell University, where his enthusiasm and range of interests make him one of the most popular professors on campus.

This lecture will be of interest to nature-lovers of all ages. It will begin at 8 p.m. at the IES Plant Science Building, and is free of charge.

Jungleburger *from page 2*

Note: Dr. Ghillean T. Prance, Director of the Institute of Economic Botany, the IES 'sister organization' at The New York Botanical Garden, and his colleagues are involved in a number of ethnobotany studies in the Amazon region of South America. The scientists' research includes work with Indian tribes in Brazil, Bolivia, Ecuador, Peru and Venezuela to document local uses for tropical plants.

Winter Calendar

COURSES

Spring Adult Education Program courses in landscape design, gardening and botany will begin in April:

Construction I. Grading and Drainage
Landscape Design Theory
Landscape Design II. Plan Development
Drawing for Plan Presentation
Insect Pests and Diseases of Plants
Edible Wild Plants Workshop

Special Landscape Design Workshops

Naturalistic Landscaping: Enhancing Wildlife and Plant Diversity
Saturday, March 14th

Designing with Native Plant Communities
Saturday, May 2nd

If you would like to receive a catalogue, call the Gifford House at the number below.

ECOLOGICAL EXCURSIONS

For information on the following, see the Adult Education Program catalogue or call the number below:

The New York Flower Show (March 12)
Wildlife in Winter: Bear Watch (March 16)
Garden in the Woods (May 27)
Cape Cod Ecology and Whale Search (June 5-7)
The Ecology of Tivoli Bay: An Exploration by Canoe (June 13)
Ecology at Black Rock Forest (June 20)
Island and Marine Ecology in Bermuda (October 5-12)

Registration deadlines are approximately a month before the trip date (in brackets), so sign up now.

SUNDAY ECOLOGY PROGRAMS

Free public programs are offered on the first and third Sunday of each month. All programs are from one to two hours long, and begin at 2:00 pm at the Gifford House unless otherwise noted.

Tentative schedule (please call the number below to confirm the day's topic):

March 1st - Stream ecology walk for the hardy (Dave Strayer) - Walk
March 15th - Woodlot management for small land-owners (Jon Kays) - Walk

For more information, call (914) 677-5359 weekdays from 8:30 - 4:30

April 5th - Ecosystem studies: Connections between life and land (Alan Berkowitz) - Walk
April 19th - Easter Sunday ... the Arboretum is closed

May 3rd - An ecological approach to habitat management (bring your own clippers!) (Mark McDonnell) - Walk
May 17th - What spring brings to the forest (Gary Lovett) - Walk

Walk: wear clothing and footwear appropriate for weather conditions

Talk: slide presentation, in the Gifford House

SCIENTIFIC SEMINARS

The Institute's weekly program of scientific seminars features presentations by visiting scientists or Institute staff. All seminars take place in the Plant Science Building on Fridays at 3:30 p.m. Admission is free. For a schedule, contact Julie Morgan at (914) 677-5343.

ARBORETUM HOURS

Monday through Saturday, 9 a.m. to 4 p.m.; Sunday, 1 - 4 p.m. The Gift and Plant Shops are open Tuesday through Saturday 11 a.m. to 4 p.m.; Sunday 1 - 4 p.m. Closed on public holidays. All visitors must obtain a free permit at the Gifford House for access to the Arboretum. Roads closed to vehicles when snow covered and during the deer hunting season.

MEMBERSHIP

Take out a membership in the Mary Flagler Cary Arboretum. Benefits include a special member's rate for IES courses and excursions, a 10% discount on purchases from the Gift Shop, six issues of the IES Newsletter each year, free subscription to *Garden* (the beautifully illustrated magazine for the enterprising and inquisitive gardener), and parking privileges and free admission to the Enid A. Haupt Conservatory at The New York Botanical Garden in the Bronx. Individual membership is \$25; family membership is \$35. For information on memberships, contact Janice Claiborne at (914) 677-5343.

Note: Your membership contribution to the Mary Flagler Cary Arboretum is eligible for the IBM Matching Grants Program for Hospitals and the Arts.

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